United States
Department of
Agriculture

**Forest
Service**

Forest
Products
Laboratory

Dividends From Wood Research

Recent Publications

January–June 1998

Explanation and Instructions

"Dividends From Wood Research" is a semiannual listing of recent publications resulting from wood utilization research at the Forest Products Laboratory (FPL). These publications are produced to encourage and facilitate application of Forest Service research. This issue lists publications received between January 1 and June 30, 1998.

Each publication listed in this brochure is available through at least one of the following sources.

Available from FPL (indicated by an order number before the title of the publication): Quantities limited. Circle the order number on the blank at the end of the brochure and mail or fax the blank to FPL.

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List of Categories

Publications are listed in this brochure within the following general categories:

Decay Processes and Bioprocessing

Durability

General

Papermaking and Paper Recycling

Properties and Use of Wood, Composites, and Fiber Products

Surface Chemistry

Timber and Fiber Demand and Technology Assessment

Wood Anatomy and Identification

Wood Chemistry

Decay Processes and Bioprocessing

Pichia stipitis Genes for Alcohol Dehydrogenase With Fermentative and Respiratory Functions

Cho, Jae-Yong; Jeffries, Thomas W.
1998. Appl. Environ. Microbiol. 64(4): 1350–1358.

Carpogenesis and Basidiosporogenesis by _Flammulina velutipes, Schizophyllum commune,_ and _Trametes versicolor in vitro_

Croan, Suki C.; Young-Ho Kim
1997. Mater. und Org. 31(1): 1–16.

Control of Wood Decay by _Trichoderma (Gliocladium) virens_—I. Antigonistic Properties

Highley, Terry L.
1997. Mater. und Org. 31(2): 79–89.

Biotechnology in the Study of Brown- and White-Rot Decay

Highley, Terry L.; Dashek, William V.
1998. _In_: Bruce, Alan; Palfreyman, John W., eds. Forest products biotechnology. London, Great Britain: Taylor & Francis: 15–36.

Comparative Study of Xylanase Kinetics Using Dinitrosalicylic, Arsenomolybdate, and Ion Chromatographic Assays

Jeffries, Thomas W.; Yang, Vina W.; Davis, Mark W.
1998. Appl. Biochem. and Biotechnol. 70–72: 257–265.

Cloning and Characterization of Two Pyruvate Decarboxylase Genes From _Pichia stipitis_ CBS 6054

Lu, Ping; Davis, Brian P.; Jeffries, Thomas W.
1998. Appl. Environ. Microbiol. 64(1): 94–97.

Decay of Chemically Modified Pine and Eucalyptus Flakeborads Exposed to White- and Brown-Rot Fungi

Okino, Esmeralda Y.A.; Rowell, Roger M.; Santana, Marcos A.E.; De Souza, Mario R.
1998. Ciência e Cultura J. Brazilian Assoc. Advance. Sci. 50(1): 52–55.

Durability

Distribution of Borates Around Point Source Injections in Dry Wood Members

De Groot, Rodney C.; Felton, Colin C.
1998. Holzforschung. 52(1): 37–45.

Field Durability of CCA- and ACA-Treated Plywood Composed of Hardwood and Softwood Veneers

De Groot, Rodney C.; Gjovik, Lee R.; Crawford, Douglas; Woodward, Bessie
1998. Forest Prod. J. 48(2): 76–82.

▷ **1. Soil-Contact Decay Tests Using Small Blocks—A Procedural Analysis**

De Groot, Rodney C.; Evans, James W.; Forsyth, Paul G.; Freitag, Camille M.; Morrell, Jeffrey
1998. USDA Forest Serv. Res. Pap. FPL–RP–571. 7 p.

In this study, procedural aspects of soil-jar decay tests with 1-cm^3 blocks were critically examined. Differences among individual bottles were a major source of variation in this method. The reproducibility and sensitivity of the soil-jar method using small blocks must be further characterized before it can be accepted as a standard protocol for evaluating preservative-treated wood.

Modelling the Char Behaviour of Structural Timber

Lau, P.W.C.; Van Zeeland, I. ; White, R.
1998. *In*: Proceedings of the 5th international conference of Fire and Materials '98; 1998 February 23–24; San Antonio, TX. London, United Kingdom: Interscience Communications Ltd.: 123–135.

The Role of Grade and Thickness in the Degradation of Fire-Retardant-Treated Plywood

Lebow, Stan T.; Winandy, Jerrold E.
1998. Forest Prod. J. 48(6): 88–94.

Nondestructive Evaluation of Wood

Ross, Robert J.; Brashaw, Brian K.; Pellerin, Roy F.
1998. Forest Prod. J. 48(1): 14–19.

Effect of Thickness Variation on Warp in High-Temperature Drying Plantation-Grown Loblolly Pine 2 by 4's

Simpson, William T.; Tschernitz, John L.
1998. Wood Fiber Sci. 30(2): 165–174.

Kiln-Drying Maple Structural Lumber From Log Heart Cants

Simpson, William T.; Forsman, John W.; Ross, Robert J.
1998. Forest Prod. J. 48(6): 70–76.

Comparison of Test Protocols for Standard Room/Corner Tests

White, R.H.; Dietenberger, M.A.; Tran, H.
1998. *In*: Proceedings of the 5th international conference of Fire and Materials '98; 1998 February 23–24; San Antonio, TX. London, United Kingdom: Interscience Communications Ltd.: 77–88.

General

▷ **2. Sawtooth Forces in Cutting Tropical Hardwoods Native to South America**

Loehnertz, Stephen P.; Cooz, Iris Vazquez
1998. USDA Forest Serv. Res. Pap. FPL–RP–567. 16 p.

As a result of design, operation, and maintenance, sawblades used in tropical sawmills can cause many problems. Improvements in these areas are needed to reduce the waste associated with sawing of tropical species that are regarded as difficult to cut. In this study, cutting experiments that simulated bandsawing of tropical hardwoods showed the effect of chip thickness, moisture content, and edge condition on the forces acting on the sawtooth. Forces were measured in three directions: parallel, normal, and lateral to the cut.

▷ **3. Pest Risk Assessment of the Importation into the United States of Unprocessed *Pinus* and *Abies* Logs From Mexico**

Tkacz, Borys M.; Burdsall, Harold H., Jr.; DeNitto, Gregg A.; Eglitis Andris; Hanson, James B.; Kliejunas, John T.; Wallner, William E.; O'Brien, Joseph G.; Smith, Eric L.
1998. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–104. 116 p.

The unmitigated pest risk potential for the importation of *Pinus* and *Abies* logs from all states of Mexico into the United States was assessed by estimating the probability and consequences of establishment of representative insects and pathogens of concern. Twenty-two individual pest risk assessments were prepared for *Pinus* logs, twelve dealing with insects and ten with pathogens. Six individual assessments were prepared for *Abies* logs. The selected organisms were representative examples of insects and pathogens found on the bark, in the bark, and in the wood of *Pinus* or *Abies* logs. Because of several requests from forest industries in the United States to import logs of *Pinus* and *Abies* species from Mexico, Animal and Plant Health Inspection Service requested that the USDA Forest Service prepare a pest risk assessment. The objectives of the risk assessment were to identify potential pests in all the states of Mexico, estimate the probability of their entry on Mexican logs and establishment in the United States, and evaluate the economic, environmental, and social consequences of such an establishment. This report documents the results of this assessment.

Papermaking and Paper Recycling

Recycling Evaluation of Newly Developed Environmentally Benign Pressure Sensitive Adhesive for Postage Applications

Abubakr, Said; Peng, Joe
1998. *In*: Großmann, H.; Galland, G.; Hanecker, E. Proc. PTS CTP deinking symposium 1998; Munich: Papiertechnische Stiftung. PTS Symposium PTS-SY 01/98: 510.

Laboratory and Pilot-Scale Recycling of Benign Pressure Sensitive Adhesive Stamp Materials

Donermeyer, Donald; Ross Sutherland, Nancy; Bennett, Leslie; Shilts, Richard; Spielvogel, Sara
1998. *In*: Proceedings, 5th international recycling technology conference; 1998 February 9–10; Brighton, United Kingdom. Leatherheac Surrey, United Kingdom: Pira International: Paper 14.

Paper Friction—Influence of Measurement Conditions

Johansson, Anna; Fellers, Christer; Gunderson, Dennis; Haugen, Urban
1998. Tappi J. 81(5): 175–183.

Performance of Enzymatically Deinked Recovered Paper on Paper Machine Runnability

Rutledge–Cropsey, Kathie; Klungness, John H.; Abubakr, |Said M.
1998. Tappi J. 81(2): 148–151.

Constitutive Modeling of Paper Accounting for Rate of Load and Transient Relative Humidity Effects

Saliklis, Edmond P.; Kuskowski, Steven J.
1998. Tappi J. 81(2): 181–188.

Stickie Removal Using Neutral Enzymatic Repulping and Pressure Screening

Sykes, M; Klungness J; Gleisner, R; Abubakr, S.
1998. *In*: Proceedings, TAPPI 1998 recycling symposium; 1998 March 8–12; New Orleans, LA. Atlanta, GA: TAPPI: 291–297.

Properties and Use of Wood, Composites, and Fiber Products

▷ **4. Flake Storage Effects on Properties of Laboratory-Made Flakeboards**

Carll, Charles
1998. USDA Forest Serv. Res. Note FPL–RN–0267. 10 p.

Objectives of this study were to determine if storage of flakes, as sometimes occurs in laboratories, influences their surface wettability and to determine if this could be related to properties of boards made from them.

Dynamic and Mechanical Properties of Agro-Fiber Based Composites

Caulfield, Daniel F.; Stark, Nicole; Feng, Daan; Sanadi, Anand R.
1998. *In*: Balatinecz, John J.; Redpath, Tony E., eds. Progress in woodfibre-plastic composites: emergence of a new industry. Proceedings, Materials and Manufacturing in cooperation with U.S. Forest Service, Forest Products Laboratory and Unitersity of Wisconsin; 1998, June 1; Mississauga, Ontario. Mississauga, Ontario: Materials and Manufactguring Ontario.

Processing into Composites

English, Brent; Chow, Poo; Bajwa, Dilpreet Singh
1997. *In*: Rowell, Roger M.; Young, Raymond A.; Rowell, Judith, K. Paper and composites from agro-based resources. Boca Raton, FL: CRC Lewis Publishers: 269–299. Chap. 8.

Design and Performance Aspects of United States and European Glulam

Falk, Robert.
1997. *In*: Proceedings, conference on research standardization applications; 1997 June 6; Technical University, Graz, Austria. Graz, Austria: Institute for Steel Construction, Wood Construction, and Industrial Construction: 1–21. Chap. 2.

▷ **5. Field Performance of Timber Bridges—15. Pueblo County, Colorado, Stress-Laminated Deck Bridge**

Hislop, Lola E.
1998. USDA Forest Serv. Res. Pap. FPL–RP–566. 19 p.

The Pueblo County 204B bridge was constructed March 1990 in Pueblo, Colorado, as a demonstration bridge under the USDA Forest Service Timber Bridge Initiative. The stress-laminated deck superstructure is approximately 10 m long, 9 m wide, and 406 mm deep, with a skew of 10 degrees. Performance monitoring was conducted for 3 years, beginning at installation, and involved gathering data on the moisture content of the wood deck, the force level of the stressing bars, the behavior of the bridge under static load conditions, and the overall condition of the structure. In addition, long-term performance data were gathered on the force level of the stressing bars 6 years after installation. Based on monitoring evaluations, the bridge is performing well, with some crushing of the bearing plates into the outside laminations but no other structural or serviceability deficiencies.

▷ **6. Field Performance of Timber Bridges—16. North Siwell Road Stress-Laminated Bridge**

Kainz, James A.
1998. USDA Forest Serv. Res. Pap. FPL–RP–570. 17 p.

The North Siwell Road bridge was constructed during December 1994 in Hinds County, Mississippi. The bridge is a single-span, stress-laminated T-beam structure that measures 9.1 m (30 ft) long and 8.7 m (28.5 ft) wide. Performance of the bridge was monitored for 24 months, beginning at the time of installation. Monitoring involved gathering and evaluating data relative to the moisture content of the wood components, force level of stressing bars, and behavior of the bridge under static load conditions. In addition, comprehensive visual inspections were conducted to assess the overall condition of the structure. Based on field evaluations, the bridge is performing well.

Impact of Steam Pressing Variables on the Dimensional Stabilization of Flakeboard

Kwon, Jin Heon; Geimer, Robert L.
1998. Forest Prod. J. 48(4): 55–61.

Wood Mechanical Property Variation With Grain Slope

Liu, J.Y.; Ross, R.J.
1998. *In*: Murakami, H.; Luco, J.E. eds. Engineering mechanics: a force for the 21st century. Proceedings, 12th engineering mechanics conference; 1998 May 17–20; Lajolla, CA. Reston, VA: American Society Chemical Engineers: 1351–1354.

Mechanical Properties and Morphology of Impact Modified Polypropylene–Wood Flour Composites

Oksman, Kristina; Clemons, Craig
1998. J. Appl. Poly. Sci. 67(9): 1503–1513.

Inorganic-Bonded Composite Wood Panel Systems for Low-Cost Housing: A Central American Perspective

Ramirez–Coretti, A.; Eckelman, C.A.; Wolfe, R.W.
1998. Forest Prod. J. 48(4): 62–68.

Short Jute Fiber-Reinforced Polypropylene Composites: Effect of Compatibilizer

Rana, A.K.; Mandal, A.; Mitra, B.C.; Jacobson, R.; Rowell, R.; Banerjee, A.N.
1998. J. Appl. Poly. Sci. 69: 329–338.

▷ **7. Research Accomplishments for Wood Transportation Structures Based on a National Research Needs Assessment**

Ritter, Michael A.; Duwadi, Sheila Rimal.
1998. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–105.

In 1991, the USDA Forest Service, Forest Products Laboratory (FPL) and the Federal Highway Administration (FHWA) formed a joint cooperative research program for wood transportation structures. Development and execution of this program was based on a national assessment of research needs and priorities. In the 5 years since completion of the research needs assessment, significant research has been completed or is ongoing for wood transportation structures. This publication provides a summary of the research accomplishments of the joint FPL–FHWA research program for wood transportation structures.

Utilization of Natural Fibers in Plastic Composites: Problems and Opportunities

Rowell, Roger M.; Sanadi, Anand R.; Caulfield, Daniel F.; Jacobson, Rodney E.
1997. *In*: Leão, Alcides L.; Carvalho, Francisco X.; Frollini, Elisabete, eds. Lignocellulosic-plastics composites. Proceedings, First international lignocellulosics-plastics composites; 1996 March 13–15; São Paulo, Brazil: 23–51.

Properties of Styrene–Maleic Anhydride Copolymers Containing Wood-Based Fillers

Simonsen, John; Jacobson, Rodney; Rowell, Roger
1998. Forest Prod. J. 48(1): 89–92.

Wood-Fiber Reinforcement of Styrene–Maleic Anhydride Copolymers

Simonsen, John; Jacobsen, Rodney; Rowell, Roger
1998. J. Appl. Poly. Sci. 68: 1567–1573.

Effect of Species and Particle Size on Properties of Wood-Flour-Filled Polypropylene Composites

Stark, Nicole; Berger, Mark J.
1997. *In*: Proceedings, Functional fillers for thermoplastics and thermosets; 1997 December 8–10; Sand Diego, CA. Portland, ME: Intertech Conferences.

Performance of Portable T-Section Glulam Timber Bridges

Taylor, S.E.; Ritter, M.A.; Morgan, Paul A.; Franklin, John M.
1997. *In*: Proceedings, 1997 annual international meeting of the ASAE; 1997 August 10–14; Minneapolis, MN. Pap. No. 97–4083. St. Joseph, MI: American Society of Agricultural Engineers: 1–16.

Strength Criterion for Corrugated Fiberboard Under Long-Term Stress

Urbanik, Thomas J.
1998. Tappi J. 81(3): 33–37.

▷ **8. TT: A Program That Implements Predictor Sort Design and Analysis**

Verrill, Steve P.; Green, David W.; Herian, Victoria L.
1997. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–101. 21 p.

In studies on wood strength, researchers sometimes replace experimental unit allocation via random sampling with allocation via sorts based on nondestructive measurements of strength predictors such as modulus of elasticity and specific gravity. This report documents TT, a computer program that implements recently published methods to increase the sensitivity of such "predictor sort" experiments. The report consists of annotated keyboard sessions and computer output from runs of TT.

▷ **9. Field Performance of Timber Bridges—12. Christian Hollow Stress-Laminated Box-Beam Bridge**

Wacker, James P.; Catherman, Stephen C.; Winnett, Richard G.
1998. USDA Forest Serv. Res. Pap. FPL–RP–560. 17 p.

In January 1992, the Christian Hollow bridge was constructed in Steuben County, New York. The bridge is a single-span, stress-laminated box-beam superstructure that is 9.1 m long, 9.8 m wide, and 502 mm deep (30 ft long, 32 ft wide, and 19-3/4 in. deep). The performance of the bridge was continuously monitored for 28 months, beginning shortly after installation. Performance monitoring involved gathering and analyzing data relative to the wood moisture content, force level in the stressing bars, vertical bridge creep, and behavior under static load conditions. In addition, comprehensive visual inspections were conducted to assess the condition of the overall structure. Based on field evaluations, the bridge is performing well with no structural or serviceability deficiencies.

Effects of Incising on Lumber Strength and Stiffness: Relationships Between Incision Density and Depth, Species, and MSR Grade

Winandy, Jerrold E.; Morrell, Jeffrey J.
1998. Wood Fiber Sci. 30(2): 185–197.

▷ **10. Predicting Bending Strength of Fire-Retardant-Treated Plywood From Screw-Withdrawal Tests**

Winandy, Jerrold E.; Lebow, Patricia K.; Nelson, William
1998. USDA Forest Serv. Res. Pap. FPL–RP–568. 20 p.

This report describes the development of a test method and predictive model to estimate the residual bending strength of fire-retardant-treated plywood roof sheathing from measurement of screw-withdrawal force. The preferred test methodology is described in detail. Models were developed to predict loss in mean and lower prediction bounds for plywood bending strength as a function of a screw-withdrawal force. Analysis of fire-retardant-treated plywood from three different studies, each with various fire-retardant-treatment, processing, plywood thickness, and exposure temperature groupings, clearly indicated that different fire-retardant-treatments and plywood thicknesses could not be grouped into a single universal model. Nevertheless, some grouping was possible; parameter estimates for several grouped fire-retardant formulations and plywood thicknesses are reported for mean trends and lower prediction boundaries. Although the models were shown to acceptably predict plywood bending strength, additional work is needed to expand these models to address the effects of plywood quality, wood temperature, and moisture content at time of test.

Properties of Composite Panels

Youngquist, John A.; Krzyski, Andrzej M.; Chow, Poo; Meimban, Roger
1997. *In*: Rowell, Roger M.; Young, Raymond A.; Rowell, Judith, K. Paper and composites from agro-based resources. Boca Raton, FL: CRC Lewis Publishers: 301–336. Chap. 9.

Surface Chemistry

Analysis and Stability of Aldehydes and Terpenes in Electropolished Canisters

Batterman, Stuart A.; Zhang, Guo–Zheng; Baumann, Melissa
1998. Atmospheric Environ. 32(10): 1647–1655.

Utilization of Black Wattle Bark and Tannin Liquefied in Phenol in the Preparation of Resol-Type Adhesives

Santana, Marcos A.E.; Baumann, Melissa G.D.; Conner, Anthony H.
1997. *In*: Leão, Alcides L.; Arvalho, Francisco X.; Frollini, Elisabete, eds. Lignocellulosic-plastics composites. Proceedings, First international lignocellulosics-plastics composites; 1996 March 13–15; São Paulo, Brazil: 325–341.

The Finish Line: Practical Facts on Wood Finishing From FPL

Williams, R. Sam; Knaebe, Mark T.
1997. Am.Paint & Coat. J.Conven. Daily: November 3, 1997.

Timber and Fiber Demand and Technology Assessment

▷ **11. Growth Model for Uneven-Aged Loblolly Pine Stands—Simulations and Management Implications**

Lin, Ching–Rong; Buongiorno, Joseph; Prestemon, Jeff; Skog, Kenneth
1998. USDA Forest Serv. Res. Pap. FPL–RP–569. 13 p.

A density-dependent matrix growth model of uneven-aged loblolly pine stands was developed with data from 991 permanent plots in the southern United States. The model predicts the number of pine, soft hardwood, and hard hardwood trees in 13 diameter classes, based on equations for ingrowth, upgrowth, and mortality

Engineered Wood Products: A Response to the Changing Timber Resource

McKeever, David B.
1997. Pacific Rim Wood Market Rep. 123, Gig Harbor, WA. November: p. 5, 15.

Wood Residual Quantities in the United States

McKeever, David B.
1998. BioCycle. 39(1): 65–68.

▷ **12. Wood-Based Panel Plant Locations and Timber Availability in Selected U.S. States**

McKeever, Tim; Spelter, Henry
1998. USDA Forest Serv. Gen. Tech. Rep. FPL–GTR–103. 53 p.

This report lists wood-based panel industry plant locations, production capacities, timber inventories, and wood costs for 24 U.S. states. Industry sectors covered include medium-density fiberboard, particleboard, softwood plywood, and oriented strandboard. Maps of major forest producing states show plant locations and the underlying density of timber stocking by county. The study relates physical measures of timber availability to market measures of timber scarcity and draws inferences about the potential of selected states to increase timber output at their present rate of forest productivity.

Substitution

Spelter, Henry
1998. Timber Processing. (March): 36–42.

Wood Anatomy and Identification

Wood Anatomy of *Jacaranda* (Bignoniaceae): Systematic Relationships in Sections *Monolobos* and *Dilobos* as Suggested by Twig and Stem Wood Rays

Dos Santos, Gracielza; Miller, Regis B.
1997. IAWA J. 18(4): 369–383.

Wood Chemistry

FT-Raman Spectroscopy of Wood: Identifying Contributions of Lignin and Carbohydrate Polmers in the Spectrum of Black Spruce (*Picea mariana*)

Agarwal, Umesh P.; Ralph, Sally A.
1997. Appl. Spectroscopy. 51(11): 1648–1655.

^{13}C NMR Characterization of Guaiacyl, Guaiacyl/Syringyl and Syringyl Dehyrodgenation Polmers

Landucci, L.L.; Ralph, S.A.; Hammel, K.E.
1998. Holzforschung. 52: 160–170.

Special (Secondary) Metabolites From Wood

Obst, John R.
1998. *In*: Bruce, Alan; Palfreyman, John W., eds. Forest products biotechnology. London, Great Britain: Taylor & Francis: 151–165.

Solid State NMR Spectroscopy of Specifically ^{13}C-Enriched Lignin in Wheat Straw From Coniferin

Terashima, Noritsugu; Atalla, Rajai H.; Vanderhart, David L.
1997. Phytochem. 46(5): 863–870.

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